UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/562,526	05/19/2006	Jean-Yves Chane-Ching	99342.00074US	8056

21832 7590 08/16/2011

MCCARTER & ENGLISH, LLP HARTFORD
CITYPLACE I
185 ASYLUM STREET
HARTFORD, CT 06103

EXAMINER	
MARTINEZ, BRITTANY M	

ART UNIT	PAPER NUMBER
1734	

MAIL DATE	DELIVERY MODE
08/16/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/562,526	CHANE-CHING ET AL.	
	Examiner	Art Unit	
	BRITTANY MARTINEZ	1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 May 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9-15,17 and 19-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7, 9-15, 17 and 19-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application

Acknowledgment is made of Applicants' arguments/remarks and amendment filed on May 2, 2011. **Claims 1-7, 9-15, 17 and 19-22** are pending in the instant application, with **Claims 1-7, 10 and 11** amended. **Claims 1-7, 9-15, 17 and 19-22** have been examined. **Claims 8, 16 and 18** have been cancelled.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. **Claims 1-3, 5, 7 and 9** are rejected under 35 U.S.C. 102(b) as being anticipated by Itoi et al. (US 6,159,437), as applied in the previous Office action.

3. With regard to **Claims 1-3**, Itoi et al. disclose a composition comprising an aqueous dispersion (Itoi et al., c. 2, l. 55-57; c. 3, l. 21-27 and 36-65, in particular) of separated crystalline calcium phosphate platelets which exhibit apatite structure and wherein the calcium phosphate platelets have a short axis length of 30 to 300 nm and a long-axis length of 100 to 1000 nm (Itoi et al., c. 2, l. 55-57; c. 3, l. 21-31, in particular).

Itoi et al. do not explicitly disclose deficient apatite structure or at least 80% of the calcium phosphate platelets having a length of between 250 nm and 600 nm.

4. With regard to the deficient apatite structure of **Claim 1**, the instant Specification defines deficient apatite structure calcium phosphate as calcium phosphate with a Ca/P ratio of 1.25-1.67 (as evidenced by the instant Specification, S. 0023), and Itoi et al. discloses hydroxyapatite (Itoi et al., c. 2, l. 55-57, in particular), $Ca_{10}(PO_4)_6(OH)_2$, which has a Ca/P molar ratio of 1.67. Thus, the calcium phosphate of Itoi et al. would have deficient apatite structure to no less an extent than that of the instant application.

5. With regard to the at least 80% of the calcium phosphate platelets having a length of between 250 nm and 600 nm of **Claim 1**, Itoi et al. disclose apatite crystals with a short axis length of 30 to 300 nm and a long-axis length of 100 to 1000 nm (Itoi et al., c. 3, l. 29-31, in particular). At least 80% of the calcium phosphate platelets of Itoi et al. would inherently have a length of between 250 nm and 600 nm. For a reference which neither expressly describes or teaches the subject matter alleged to be anticipated, the reference must provide enough information to permit an inference that the subject matter is inherent. *Ex parte Garvin*, 62 USPQ 2d 1680 (BPAI 2001). If the average particle size of the calcium phosphate platelets of Itoi et al. in the range of 100 to 1000 nm is 500 nm, then at least 80% of the calcium phosphate platelets of Itoi et al. would most surely have a length of between 250 nm and 600 nm. Accordingly, the burden shifts to Applicants to show that the calcium phosphate platelets of Itoi et al. would not have at least 80% of the calcium phosphate platelets with a length of between 250 nm and 600 nm.

6. With regard to **Claim 5**, Itoi et al. disclose a plurality of the platelets having an apatite structure (Itoi et al., c. 2, l. 55-57; c. 3, l. 21-27, in particular). Although Itoi et al. do not explicitly disclose the platelets exhibiting a chemical shift of between 3 ppm and 3.4 ppm, measured by phosphorous-31 MAS NMR, the platelets of Itoi et al. would be expected to exhibit a chemical shift of between 3 ppm and 3.4 ppm, measured by phosphorous-31 MAS NMR since the platelets of Itoi et al. have an apatite structure.

7. With regard to **Claim 7**, Itoi et al. disclose hydroxyapatite (Itoi et al., c. 2, l. 55-57, in particular), $Ca_{10}(PO_4)_6(OH)_2$, which has a Ca/P molar ratio of 1.67.

8. With regard to **Claim 9**, Itoi et al. disclose a colloidal dispersion comprising calcium phosphate platelets in an aqueous solution containing a dispersing agent (Itoi et al., c. 2, l. 55-57; c. 3, l. 21-27 and 36-65, in particular).

9. **Claims 1 and 2** are rejected under 35 U.S.C. 102(a) as being anticipated by Roeder et al. (US 2003/0031698 A1), as applied in the previous Office action.

10. With regard to **Claims 1 and 2**, Roeder et al. disclose a composition comprising an aqueous dispersion of separated crystalline calcium phosphate platelets which exhibit monetite structure and wherein the calcium phosphate platelets have a mean length of between 1 nm and 500 nm (Roeder et al., "Abstract;" Fig. 2; Table 1; 0014; 0031; 0033; 0035; 0047, in particular). Roeder et al. do not explicitly disclose at least 80% of the calcium phosphate platelets having a length of between 250 nm and 600 nm.

11. With regard to the at least 80% of the calcium phosphate platelets having a length of between 250 nm and 600 nm of **Claim 1**, Roeder et al. disclose the calcium phosphate platelets have a mean length of between 1 nm and 500 nm (Roeder et al., 0035, in particular). At least 80% of the calcium phosphate platelets of Roeder et al. would inherently have a length of between 250 nm and 600 nm. For a reference which neither expressly describes or teaches the subject matter alleged to be anticipated, the reference must provide enough information to permit an inference that the subject matter is inherent. *Ex parte Garvin*, 62 USPQ 2d 1680 (BPAI 2001). If the average particle size of the calcium phosphate platelets of Roeder et al. in the range of 1 nm and 500 nm is 480-500 nm, then at least 80% of the calcium phosphate platelets of Roeder et al. would most surely have a length of between 250 nm and 600 nm. Accordingly, the burden shifts to Applicants to show that the calcium phosphate platelets of Roeder et al. would not have at least 80% of the calcium phosphate platelets with a length of between 250 nm and 600 nm.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. **Claims 1-3, 5, 7 and 9** are rejected under 35 U.S.C. 103(a) as being unpatentable over Itoi et al. (US 6,159,437), as applied in the previous Office action.

16. With regard to **Claims 1-3**, Itoi et al. is applied as above. Itoi et al. do not explicitly disclose deficient apatite structure or at least 80% of the calcium phosphate platelets having a length of between 250 nm and 600 nm.

17. With regard to the deficient apatite structure of **Claim 1**, the instant Specification defines deficient apatite structure calcium phosphate as calcium phosphate with a Ca/P ratio of 1.25-1.67 (as evidenced by the instant Specification, S. 0023), and Itoi et al.

discloses hydroxyapatite (Itoi et al., c. 2, l. 55-57, in particular), $Ca_{10}(PO_4)_6(OH)_2$, which has a Ca/P molar ratio of 1.67. Thus, the calcium phosphate of Itoi et al. would have deficient apatite structure to no less an extent than that of the instant application.

18. With regard to the calcium phosphate platelets having a length of between 250 nm and 600 nm of **Claim 1**, the claimed particle size range overlaps the range disclosed by Itoi et al. and thus, a *prima facie* case of obviousness exists. *See* In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990); In re Geisler, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997). Optimization of the platelet size range would have been obvious to one of ordinary skill in the art at the time of invention. *See* Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382; In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

19. With regard to the at least 80% of the calcium phosphate platelets having a length of between 250 nm and 600 nm of **Claim 1**, Itoi et al. disclose apatite crystals with a short axis length of 30 to 300 nm and a long-axis length of 100 to 1000 nm (Itoi et al., c. 3, l. 29-31, in particular). If the average particle size of the calcium phosphate platelets of Itoi et al. in the range of 100 to 1000 nm is 500 nm, then at least 80% of the calcium phosphate platelets of Itoi et al. would most surely have a length of between 250 nm and 600 nm. In any event, optimization of the platelet size would have been obvious to one of ordinary skill in the art.

20. With regard to **Claim 5**, Itoi et al. is applied as above. Although Itoi et al. do not explicitly disclose the platelets exhibiting a chemical shift of between 3 ppm and 3.4 ppm, measured by phosphorous-31 MAS NMR, the platelets of Itoi et al. would be expected to exhibit a chemical shift of between 3 ppm and 3.4 ppm, measured by phosphorous-31 MAS NMR since the platelets of Itoi et al. have an apatite structure.

21. With regard to **Claim 7**, Itoi et al. is applied as above.

22. With regard to **Claim 9**, Itoi et al. is applied as above.

23. **Claims 1-4, 6, 9-15, 17 and 19-22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Roeder et al. (US 2003/0031698 A1), as applied in the previous Office action.

24. With regard to **Claims 1 and 2**, Roeder et al. is applied as above. Roeder et al. do not explicitly disclose at least 80% of the calcium phosphate platelets having a length of between 250 nm and 600 nm.

25. With regard to **Claim 4**, Roeder et al. disclose a plurality of the platelets having a monetite structure (Roeder et al., "Abstract;" Fig. 2; Table 1; p. 2, 0014; p. 3, 0033 and 0035; p. 5, 0047, in particular).

26. With regard to **Claim 6**, Roeder et al. disclose monetite (Roeder et al., Table 1, in particular), $CaHPO_4$, which has a Ca/P molar ratio of 1.

27. With regard to **Claim 9**, Roeder et al. disclose a colloidal dispersion comprising calcium phosphate platelets in an aqueous solution containing a dispersing agent (Roeder et al., p. 3, 0031, in particular).

28. With regard to **Claims 10-15, 17 and 19-22**, Roeder et al. disclose a method of preparing an aqueous dispersion of crystalline, separated calcium phosphate platelets which exhibit monetite structure and have a mean length of between 1 nm and 500 nm (Roeder et al., "Abstract;" Fig. 2; Table 1; 0014; 0031; 0033; 0035; 0047, in particular), wherein the method comprises the steps of preparing solutions of calcium salt (calcium nitrate or calcium chloride), pH modifying precursors, and phosphate solution (ammonium orthophosphate or the like); heat treating the solution at a temperature from about 37°C to about 200°C; separating the calcium phosphate formed from the solution; and preparing the dispersion of calcium phosphate platelets in the aqueous solvent (water) (Roeder et al., "Abstract;" Fig. 2; Table 1; 0014; 0031; 0033; 0035; 0044-0050, in particular). Roeder et al. further disclose the size and morphology of the calcium phosphate particles can be readily controlled by adjusting the reactant concentrations, solution pH, reaction heating rate, mixing reaction temperature, and length of reaction (Roeder et al., 0045, in particular).

29. The difference between the process of Roeder et al. and that of **Claim 10** is Roeder et al. do not disclose first preparing the calcium salt solution and then adding the phosphate solution to the calcium salt solution, adjusting the pH of the solution to a selected value of between 4 and 6, adding the phosphate solution over a period of time of between 30 minutes and 4 hours, so as to obtain a calcium to phosphorous molar ratio of between 1 and 2.5, wherein the pH is maintained constant at the selected value of between 4 and 6, nor at least 80% of the calcium phosphate platelets having a length of between 250 nm and 600 nm.

30. The difference between the process of Roeder et al. and that of **Claim 11** is Roeder et al. do not disclose first preparing the calcium salt solution and then adding the phosphate solution to the calcium salt solution, adjusting the pH of the solution to a selected value of between 4 and 6, adding the phosphate solution over a period of time of between 30 minutes and 4 hours, so as to obtain a calcium to phosphorous molar ratio of between 1 and 2.5, wherein the pH is maintained constant at the selected value of between 4 and 6, adjusting the pH of the solution to a value of between 8 and 9.5, nor at least 80% of the calcium phosphate platelets having a length of between 250 nm and 600 nm.

31. Roeder et al. do not disclose a calcium phosphate platelet thickness of between 1 nm and 40 nm (**Claim 3**); the platelets exhibiting a chemical shift of between -1.4 ppm and -1 ppm, as measured by phosphorous-31 MAS NMR (**Claim 4**); the concentration of calcium salt in the solution of calcium salt between 1M and 2.5M (**Claims 13 and 20**); the phosphate solution being a solution of $(NH_4)_2(HPO_4)$ or $(NH_4)(H_2PO_4)$ (**Claims 14 and 21**); nor the calcium to phosphate molar ratio between 1.3 and 1.7 (**Claims 15 and 22**).

32. With regard to the calcium phosphate platelets having a length of between 250 nm and 600 nm of **Claims 1, 10 and 11**, the claimed particle size range overlaps the range disclosed by Roeder et al. and thus, a *prima facie* case of obviousness exists. *See* In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990); In re Geisler, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997). Optimization of the platelet size range

would have been obvious to one of ordinary skill in the art at the time of invention. *See* Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382; In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997). Roeder et al. disclose that the size and morphology of the particles can be controlled by adjusting various reaction parameters (Roeder, 0045, in particular).

33. With regard to the at least 80% of the calcium phosphate platelets having a length of between 250 nm and 600 nm of **Claims 1, 10 and 11**, Roeder et al. disclose the calcium phosphate platelets have a length of between 1 nm and 500 nm (Roeder et al., 0035, in particular). If the average particle size of the calcium phosphate platelets of Roeder et al. in the range of 1 nm and 500 nm is 480-500 nm, then at least 80% of the calcium phosphate platelets of Roeder et al. would most surely have a length of between 250 nm and 600 nm. In any event, optimization of the platelet size would have been obvious to one of ordinary skill in the art at the time of invention. Roeder et al. disclose that the size and morphology of the particles can be controlled by adjusting various reaction parameters (Roeder, 0045, in particular).

34. With regard to **Claim 3**, an expected platelet thickness is a result effective variable since one of ordinary skill in the art would expect different properties in the product as such thickness varies. Roeder et al. disclose that the size and morphology of the particles can be controlled by adjusting various reaction parameters (Roeder,

0045, in particular). Since the platelet thickness is a result effective variable, it is within the skill of one of ordinary skill in the art to develop a suitable calcium phosphate platelet thickness. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

35. With regard to **Claim 4**, the platelets of Roeder et al. would be expected to exhibit a chemical shift of between -1.4 ppm and -1 ppm, as measured by phosphorous-31 MAS NMR since the platelets of Roeder et al. have a monetite structure (Roeder et al., Table 1, in particular).

36. With regard to the order of preparing and adding the calcium salt solution and phosphate solution of **Claims 10 and 11**, selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results. *See* In re Burhans, 154 F.2d 690, 69 USPQ 330 (CCPA 1946); Ex parte Rubin, 128 USPQ 440 (Bd. App. 1959); and In re Gibson, 39 F.2d 975, 5 USPQ 230 (CCPA 1930).

37. With regard to **Claims 10 and 11**, solution pH is a result effective variable, as evidenced by Roeder et al. (Roeder et al., 0045, in particular). Roeder et al. disclose the size and morphology of the calcium phosphate particles can be readily controlled by adjusting the solution pH (Roeder et al., 0045, in particular). Since the solution pH is a result effective variable, it is within the skill of one of ordinary skill in the art to develop a suitable pH of the solution. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

38. With regard to **Claims 10 and 11**, length of reaction is a result effective variable, as evidenced by Roeder et al. (Roeder et al., 0045, in particular). Roeder et al. disclose the size and morphology of the calcium phosphate particles can be readily controlled by adjusting the length of reaction (Roeder et al., 0045, in particular). Since the length of

reaction is a result effective variable, it is within the skill of one of ordinary skill in the art to develop a suitable time period for the addition of the phosphate solution. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

39. With regard to **Claims 10, 11, 15 and 22**, reactant molar ratio is a result effective variable since one of ordinary skill in the art would expect different properties in the process and resulting product as such parameter varies. Since the reactant molar ratio is a result effective variable, it is within the skill of one of ordinary skill in the art to develop a suitable calcium to phosphate molar ratio. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

40. With regard to **Claims 13 and 20**, reactant concentration is a result effective variable, as evidenced by Roeder et al. (Roeder et al., 0045, in particular). Roeder et al. disclose the size and morphology of the calcium phosphate particles can be readily controlled by adjusting the reactant concentrations (Roeder et al., 0045, in particular). Since the reactant concentration is a result effective variable, it is within the skill of one of ordinary skill in the art to develop a suitable concentration of calcium salt in the solution of calcium salt. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

41. With regard to **Claims 14 and 21**, Roeder et al. disclose the phosphate solution being a solution of ammonium orthophosphate or the like (Roeder et al., 0044, in particular). The various ammonium phosphates (including $(NH_4)_2(HPO_4)$ or $(NH_4)(H_2PO_4)$) would have been obvious to one of ordinary skill in the art at the time of invention in view of the "ammonium orthophosphate, and the like" of Roeder et al. (Roeder et al., 0044, in particular) (emphasis added).

42. **Claims 14 and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Roeder et al. (US 2003/0031698 A1) as applied to **Claims 10 and 11** above, and further in view of Kumta et al. (US 7,247,288 B2), as applied in the previous Office action.

43. With regard to **Claims 14 and 21**, Roeder et al. disclose the phosphate solution being a solution of ammonium orthophosphate or "the like" (Roeder et al., 0044, in particular).

44. Roeder et al. do not disclose the phosphate solution being a solution of $(NH_4)_2(HPO_4)$ or $(NH_4)(H_2PO_4)$ (**Claims 14 and 21**).

45. With regard to **Claims 14 and 21**, Kumta et al. disclose a method for preparing nanocrystalline calcium phosphate platelets (Kumta et al., "Abstract," in particular) comprising the steps of: preparing a solution of calcium salt ($CaCl_2$ or $Ca(NO_3)_2$) (Kumta et al., c. 1, l. 66; c. 4, l. 53-57; c. 8, l. 27-35, in particular); adding a phosphate solution ($(NH_4)_2(HPO_4)$) (Kumta et al., c. 1, l. 66; c. 8, l. 35-41, in particular) to the calcium salt solution (Kumta et al., c. 14, l. 58-67; c. 15, l. 1-3; c. 18, l. 27-32 and 40-47, in particular), so as to obtain a calcium to phosphorus molar ratio of greater than 1.67 (Kumta et al., c. 4, l. 48-51, in particular), wherein the pH is maintained constant (Kumta et al., c. 6, l. 8-18, in particular); heat treating the solution (Kumta et al., c. 15, l. 5-8; c. 18, l. 50-53, in particular); and separating the calcium phosphate platelets formed from the solution (Kumta et al., c. 15, l. 5-8, in particular).

46. Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to try to modify the process disclosed by Roeder et al. with $(NH_4)_2(HPO_4)$ as taught by Kumta et al. because one of ordinary skill in the art could have pursued the known potential phosphate solution options within his or her technical grasp with a reasonable expectation of success.

Double Patenting

47. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

48. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory

double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

49. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

50. **Claims 1-5, 9-15, 17 and 19-22** are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over Claims 1-6 of U.S. Patent No. 7,807,724 B2, as applied in the previous Office action. Although the conflicting claims are not identical, they are not patentably distinct from each other because copending U.S. Patent No. 7,807,724 B2 discloses a composition comprising a dispersion of separated calcium phosphate platelets and a process for making such, substantially as in the instant claims.

Response to Amendment

Applicants' amendment filed on May 2, 2011, with respect to the Claims has been fully considered and is accepted. The 35 U.S.C. 112 rejections of the previous Office action have been withdrawn.

Response to Arguments

51. Applicants' arguments filed May 2, 2011, with regard to the prior art rejections of the previous Office action (Applicants' Response, 5/2/2011, p. 7-13) have been fully considered but they are not persuasive.

Itoi

52. Applicants' arguments that Itoi et al. do not disclose an aqueous dispersion because "[o]ne skilled in the art would not view the dispersion in organic solvent described in Itoi as an aqueous dispersion merely because some water might be added to the organic solvent" and "[a]n aqueous dispersion is a dispersion in water" (Applicants' Response, 5/2/2011, p. 7) are not convincing. While Itoi disperses the calcium phosphate particles in an organic solvent, the dispersion may comprise water in addition to the organic solvent (Itoi et al., c. 3, l. 36-46, in particular). Applicants admit that "Itoi states that up to 50 percent by weight water may be added to the organic solvent" (Applicants' Response, 5/2/2011, p. 7). A dispersion comprising 50 percent by weight water is not merely "some water...added to the organic solvent." A dispersion comprising water, especially 50 percent by weight water, is an aqueous dispersion.

Applicants have not provided any evidence indicating otherwise. Attorney arguments are not evidence.

53. Applicants' argument that Itoi et al. only disclose examples that utilize organic solvent without water (Applicants' Response, 5/2/2011, p. 7-8) is not convincing. A prior art reference is not limited to its specific examples. Rather, a prior art reference is viewed in its entirety and for what it may have reasonably suggested to one of ordinary skill in the art at the time of invention.

54. Applicants' arguments that "[o]ne skilled in the art would not be motivated to replace the organic solvent of Itoi with water to form an aqueous dispersion" and "Itoi teaches away from such a modification" because "Itoi states that the dispersion in an organic solvent may include water, but that if greater than 50% water is added, 'the apatite slurry of the present invention cannot be obtained'" (Applicants' Response, 5/2/2011, p. 9) are not convincing. While Itoi disperses the calcium phosphate particles in an organic solvent, the dispersion may comprise water in addition to the organic solvent (Itoi et al., c. 3, l. 36-46, in particular). Applicants admit that "Itoi states that up to 50 percent by weight water may be added to the organic solvent" (Applicants' Response, 5/2/2011, p. 7). A dispersion comprising water, especially 50 percent by weight water, is an aqueous dispersion. Applicants have not provided any evidence indicating otherwise. Attorney arguments are not evidence.

55. Applicants' argument that "the comparative examples of Itoi in which water alone is used to form the slurry do not meet the particle size limitations of the claims" (Applicants' Response, 5/2/2011, p. 9) is not convincing. A prior art reference is not

limited to its specific examples. Rather, a prior art reference is viewed in its entirety and for what it may have reasonably suggested to one of ordinary skill in the art at the time of invention.

Roeder

56. Applicants' argument that Roeder et al. do not disclose an aqueous dispersion wherein at least 80% of the platelets are between 250-600 nm in length (Applicants' Response, 5/2/2011, p. 8-13) is not convincing. Roeder et al. disclose the calcium phosphate platelets have a mean length of between 1 nm and 500 nm (Roeder et al., 0035, in particular). At least 80% of the calcium phosphate platelets of Roeder et al. would inherently have a length of between 250 nm and 600 nm. For a reference which neither expressly describes or teaches the subject matter alleged to be anticipated, the reference must provide enough information to permit an inference that the subject matter is inherent. *Ex parte Garvin*, 62 USPQ 2d 1680 (BPAI 2001). If the average particle size of the calcium phosphate platelets of Roeder et al. in the range of 1 nm and 500 nm is 480-500 nm, then at least 80% of the calcium phosphate platelets of Roeder et al. would most surely have a length of between 250 nm and 600 nm. Accordingly, the burden shifts to Applicants to show that the calcium phosphate platelets of Roeder et al. would not have at least 80% of the calcium phosphate platelets with a length of between 250 nm and 600 nm. In any event, optimization of the platelet size would have been obvious to one of ordinary skill in the art. A prior art reference is viewed in its entirety and further in view of what it may reasonably suggest to one of ordinary skill in the art. At some point, the composition of Roeder et al. would be a composition

comprising separated calcium phosphate platelets which exhibit monetite structure and wherein the calcium phosphate platelets have a length of between 1 nm and 500 nm (Roeder et al., "Abstract;" Fig. 2; Table 1; 0014; 0031; 0033; 0035; 0047, in particular).

57. Applicants' argument that Roeder et al. do not disclose an aqueous dispersion (Applicants' Response, 5/2/2011, p. 8-13) is not convincing. While Roeder et al. disclose the calcium phosphate dispersed within a thermoplastic polymer, the thermoplastic polymer dispersion may further comprise water (Roeder et al., 0031, in particular). The teaching by Roeder et al. that "dispersed" does not preclude contact between the particles does not necessarily mean there is contact between the particles. The fact that contact is not precluded does not give rise to the conclusion that contact is required.

58. Applicants' arguments that "one skilled in the art would not be motivated to modify Roeder to arrive at an aqueous dispersion as recited in the claims" because "Roeder describes calcium phosphate particles dispersed in a thermoplastic polymer or calcium phosphate cement matrix...used to form a biocompatible material having biomechanical properties resembling that of bone" and "[o]ne skilled in the art would not be motivated to replace the matrix material with water to arrive at the aqueous dispersion recited in claim 1 as amended" (Applicants' Response, 5/2/2011, p. 10) are not convincing. While Roeder et al. disclose the calcium phosphate dispersed within a thermoplastic polymer, the thermoplastic polymer dispersion may further comprise water (Roeder et al., 0031, in particular).

59. Applicants' argument that "[r]eplacing at least 80% of the reinforcement particles would defeat the purpose of the material described in Roeder, as the smaller particles would not provide the desired biomechanical strength" (Applicants' Response, 5/2/2011, p. 10) is not convincing because it is not supported by any evidence of record. Roeder discloses that nano-sized calcium phosphate reinforcement particles with mean dimensions form about 1 nm to about 500 nm can be used in the composite biomaterial in amounts from about 40% by volume of the composite to about 60% by volume of the composite (Roeder et al., 0035-0036, in particular). In fact, Roeder discloses that "the smaller size would be advantageous because resorption would occur more readily" (Roeder et al., 0035).

60. Applicants' arguments that "Roeder is not concerned with maintaining the calcium phosphate platelets in a dispersion" and "[o]ne skilled in the art would not be motivated to modify the composition for the matrix described in Roeder to form an aqueous dispersion, as the aqueous dispersion would not function as a cement type material" (Applicants' Response, 5/2/2011, p. 10-11) is not convincing. Roeder et al. disclose the thermoplastic polymer dispersion may further comprise water (Roeder et al., 0031, in particular) and reinforcement particle dispersion (Roeder et al., 0037, in particular).

61. Applicants' arguments that the Roeder process "does not result in an aqueous dispersion of calcium phosphate particles having the particle size recited in the claims as amended" and that "there is nothing in Roeder that would lead one skilled in the art to modify the process in Roeder to arrive at the claimed process to produce an aqueous

dispersion of calcium phosphate platelets having the particle size distribution recited in the claims as amended" (Applicants' Response, 5/2/2011, p. 11) are not convincing. Roeder et al. disclose a method of preparing an aqueous dispersion of crystalline, separated calcium phosphate platelets which exhibit monetite structure and have a mean length of between 1 nm and 500 nm (Roeder et al., "Abstract;" Fig. 2; Table 1; 0014; 0031; 0033; 0035; 0047, in particular), wherein the method comprises the steps of preparing solutions of calcium salt (calcium nitrate or calcium chloride), pH modifying precursors, and phosphate solution (ammonium orthophosphate or the like); heat treating the solution at a temperature from about 37°C to about 200°C; separating the calcium phosphate formed from the solution; and preparing the dispersion of calcium phosphate platelets in the aqueous solvent (water) (Roeder et al., "Abstract;" Fig. 2; Table 1; 0014; 0031; 0033; 0035; 0044-0050, in particular). Roeder et al. further disclose the size and morphology of the calcium phosphate particles can be readily controlled by adjusting the reactant concentrations, solution pH, reaction heating rate, mixing reaction temperature, and length of reaction (Roeder et al., 0045, in particular).

62. Applicants' argument that "the brief references in Roeder to the use of smaller particles of calcium phosphate" refer to "calcium phosphate particles...already formed and...either added to a matrix or dry mixed to form calcium phosphate cement material" (Applicants' Response, 5/2/2011, p. 12) is not convincing. The instant claims do not preclude the use of calcium phosphate particles already formed.

Kumta

63. Applicants' argument that Kumta does not "describe an aqueous dispersion having calcium phosphate platelets wherein at least 80% of the platelets are between 250-600 nm in length" (Applicants' Response, 5/2/2011, p. 12) is not convincing. Kumta was used merely to illustrate that $(NH_4)_2(HPO_4)$ is a known phosphate solution option in the nano calcium phosphate art.

64. Applicants' argument that "one skilled in the art would not combine Roeder and Kumta as suggested by the Examiner" (Applicants' Response, 5/2/2011, p. 12-13) is not convincing. The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). Roeder et al. disclose the phosphate solution being a solution of ammonium orthophosphate or "the like" (Roeder et al., 0044, in particular). Kumta et al. disclose a method for preparing nanocrystalline calcium phosphate platelets (Kumta et al., "Abstract," in particular) comprising the steps of: preparing a solution of calcium salt ($CaCl_2$ or $Ca(NO_3)_2$) (Kumta et al., c. 1, l. 66; c. 4, l. 53-57; c. 8, l. 27-35, in particular); adding a phosphate solution ($(NH_4)_2(HPO_4)$) (Kumta et al., c. 1, l. 66; c. 8, l. 35-41, in particular) to the calcium salt solution (Kumta et al., c. 14, l. 58-67; c. 15, l. 1-3; c. 18, l. 27-32 and 40-47, in particular), so as to obtain a calcium to phosphorus molar ratio of greater than 1.67 (Kumta et al., c. 4, l. 48-51, in particular), wherein the pH is maintained constant (Kumta et al., c. 6, l. 8-18, in particular); heat

treating the solution (Kumta et al., c. 15, l. 5-8; c. 18, l. 50-53, in particular); and separating the calcium phosphate platelets formed from the solution (Kumta et al., c. 15, l. 5-8, in particular). Thus, it would have been obvious to one of ordinary skill in the art at the time of invention to try to modify the process disclosed by Roeder et al. with $(NH_4)_2(HPO_4)$ as taught by Kumta et al. because one of ordinary skill in the art could have pursued the known potential phosphate solution options within his or her technical grasp with a reasonable expectation of success.

65. In response to Applicants' argument that "there is nothing in Kumta that suggests modifying the process of Roeder in a manner that would produce the aqueous dispersion recited in claims 14 and 21" (Applicants' Response, 5/2/2011, p. 13), the fact that Applicants have recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Nonstatutory obviousness-type double patenting rejection over US 7,807,724 B2

66. Applicants' argument that "[i]t would not be obvious the [*sic*] one skilled in the art to omit the complexing polymer from the solution and arrive at the aqueous dispersions or the process recited in claims 1-5, 9-15, 17 and 19-22" because "[t]here is nothing in the cited reference to have a reasonable expectation of success without the complexing polymer in the mixture" (Applicants' Response, 5/2/2011, p. 13) is not convincing. The instant claims do not preclude a complexing polymer.

Conclusion

67. **THIS ACTION IS MADE FINAL.** Applicants are reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRITTANY M. MARTINEZ whose telephone number is (571) 270-3586. The examiner can normally be reached on Monday-Friday 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Emily M. Le can be reached on (571) 272-0903. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BMM
/Brittany M Martinez/
Examiner, Art Unit 1734

/Emily M Le/
Supervisory Patent Examiner, Art Unit 1734